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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/816,728	04/02/2004	Harry Rieger	67411811.001106	1021

23562 7590 03/08/2006

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EXAMINER	
AL NAZER, LEITH A	

ART UNIT	PAPER NUMBER
2821	

DATE MAILED: 03/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/816,728	RIEGER, HARRY	
	Examiner	Art Unit	
	Leith A. Al-Nazer	2821	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 April 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *18 January 2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. New corrected drawings in compliance with 37 CFR 1.121(d) are required in this application because the drawings filed on 02 April 2004 are informal and are suitable only for examination purposes. Applicant is advised to employ the services of a competent patent draftsperson outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,640,408 to Jani et al. (hereinafter "Jani").

With respect to claim 1, Jani teaches a diode-pumped solid state laser amplifier, comprising: a laser rod (12); and at least one diode array (18) located proximate to the laser rod (figures 1 and 2), each diode array having a plurality of high-power diode bars spaced thereon wherein the spacing of the high-power diode bars and the location of

the diode array from the laser rod are selected to allow the laser rod to receive the radiation emitted by the diode bars in a substantially uniform distribution along the length of the laser rod (figures 1 and 2).

With respect to claim 17, Jani teaches a method of manufacturing a diode-pumped solid state laser amplifier, comprising: providing a laser rod (12); and locating at least one diode array (18) proximate to the laser rod (figures 1 and 2), each diode array including a plurality of high-power diode bars, wherein spacing of the high-power diode bars and the location of the diode array from the laser rod allows the laser rod to receive radiation from the diode arrays in a substantially uniform distribution along the length of the laser rod (figures 1 and 2).

4. Claims 1, 7, 8, and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,978,407 to Chang et al. (hereinafter "Chang").

With respect to claim 1, Chang teaches a diode-pumped solid state laser amplifier, comprising: a laser rod (34); and at least one diode array (30) located proximate to the laser rod (figures 2 and 7B), each diode array having a plurality of high-power diode bars spaced thereon wherein the spacing of the high-power diode bars and the location of the diode array from the laser rod are selected to allow the laser rod to receive the radiation emitted by the diode bars in a substantially uniform distribution along the length of the laser rod (figures 2 and 7B).

With respect to claim 7, Chang teaches a transparent coolant barrier surrounding the laser rod, wherein the coolant barrier is operable to pass a coolant over the surface of the laser rod ("WATER JACKET" in figure 2).

With respect to claim 8, Chang teaches the coolant comprising water ("WATER JACKET" in figure 2).

With respect to claim 17, Chang teaches a method of manufacturing a diode-pumped solid state laser amplifier, comprising: providing a laser rod (34); and locating at least one diode array (30) proximate to the laser rod (figures 2 and 7B), each diode array including a plurality of high-power diode bars, wherein spacing of the high-power diode bars and the location of the diode array from the laser rod allows the laser rod to receive radiation from the diode arrays in a substantially uniform distribution along the length of the laser rod (figures 2 and 7B).

5. Claims 1-3, 6-11, and 14-17 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent Application Publication No. 2002/0018288 to Rieger et al. (hereinafter "Rieger").

With respect to claim 1, Rieger teaches a diode-pumped solid state laser amplifier, comprising: a laser rod; and at least one diode array located proximate to the laser rod, each diode array having a plurality of high-power diode bars spaced thereon wherein the spacing of the high-power diode bars and the location of the diode array from the laser rod are selected to allow the laser rod to receive the radiation emitted by

the diode bars in a substantially uniform distribution along the length of the laser rod (figure 2; page 18).

With respect to claim 2, Rieger teaches each of the high-power diode bars producing at least about 50W (paragraph 0070).

With respect to claim 3, Rieger teaches each diode array including five high-power diode bars (figures 8-10).

With respect to claim 6, Rieger teaches five diode arrays being placed around the circumference of the laser rod with an angular separation of about 72 degrees (figures 8-10).

With respect to claim 7, Rieger teaches a transparent coolant barrier (170 and 190) surrounding the laser rod, wherein the coolant barrier is operable to pass a coolant over the surface of the laser rod.

With respect to claim 8, Rieger teaches the coolant comprising water (paragraph 0106).

With respect to claim 9, Rieger teaches a diode-pumped solid state laser amplifier, comprising: a first laser rod having a longitudinal axis; an odd number of first diode arrays located proximate to the first laser rod, each first diode array having a plurality of high-power diode bars spaced thereon wherein the spacing of the high-power diode bars and the location of the first diode array from the first laser rod are selected to allow the first laser rod to receive radiation emitted by the diode bars in a substantially uniform distribution along the length of the first laser rod, wherein the first diode arrays are positioned around the circumference of the laser rod with an even

angular separation; a second laser rod having a longitudinal axis that is aligned with the longitudinal of the first laser rod; an odd number of second diode arrays located proximate to the second laser rod, each second diode array having a plurality of high-power diode bars spaced thereon wherein the spacing of the high-power didoe bars and the location of the second diode array from the second laser rod are selected to allow the second laser rod to receive radiation emitted by the diode bars in a substantially uniform distribution along the length of the second laser rod, wherein the second diode arrays are positioned around the circumference of the laser rod with an even angular separation that is inversely proportional to the angular separation of the first diode arrays; a 90 degree rotator disposed between the first and second laser rods along the longitudinal axes of the laser rods; and a compensating lens disposed between the first and second laser rods along the longitudinal axes of the laser rods, wherein the compensating lens imparts a negative spherical lensing effect (figures 2 and 8-10; page 18).

With respect to claim 10, Rieger teaches each of the high-power diode bars producing at least about 50W (paragraph 0070).

With respect to claim 11, Rieger teaches each of the first and second diode arrays including five high-power diode bars (figures 8-10).

With respect to claim 14, Rieger teaches five diode arrays being placed around the circumference of the first laser rod with an angular separation of about 72 degrees and five diode arrays are placed around the circumference of the second laser rod with an angular separation of about 72 degrees (figures 8-10).

With respect to claim 15, Rieger teaches a transparent coolant barrier (170 and 190) surrounding the laser rod, wherein the coolant barrier is operable to pass a coolant over the surface of the laser rod.

With respect to claim 16, Rieger teaches the coolant comprising water (paragraph 0106).

With respect to claim 17, Rieger teaches a method of manufacturing a diode-pumped solid state laser amplifier, comprising: providing a laser rod; and locating at least one diode array proximate to the laser rod, each diode array including a plurality of high-power diode bars, wherein spacing of the high-power diode bars and the location of the diode array from the laser rod allows the laser rod to receive radiation from the diode arrays in a substantially uniform distribution along the length of the laser rod (figures 2 and 8-10; page 18).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,640,408 to Jani et al. (hereinafter "Jani") in view of U.S. Patent No. 6,590,911 to Spinelli et al. (hereinafter "Spinelli") or U.S. Patent Application Publication No. 2004/0233942 to Schlueter et al. (hereinafter "Schlueter").

Claim 2 requires each of the high-power diode bars produce at least about 50W. Such power requirements are well known in the art, as is evidenced by Spinelli (column 1, lines 45-55) and Schlueter (paragraph 0009). Therefore, at the time of the invention, it would have been obvious to one having ordinary skill in the art to utilize the high-power diode bars of Spinelli or Schlueter in the system of Jani. The motivation for doing so would have been to efficiently pump the laser rod.

9. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,978,407 to Chang et al. (hereinafter "Chang") in view of U.S. Patent No. 6,590,911 to Spinelli et al. (hereinafter "Spinelli") or U.S. Patent Application Publication No. 2004/0233942 to Schlueter et al. (hereinafter "Schlueter").

Claim 2 requires each of the high-power diode bars produce at least about 50W. Such power requirements are well known in the art, as is evidenced by Spinelli (column 1, lines 45-55) and Schlueter (paragraph 0009). Therefore, at the time of the invention, it would have been obvious to one having ordinary skill in the art to utilize the high-

power diode bars of Spinelli or Schlueter in the system of Chang. The motivation for doing so would have been to efficiently pump the laser rod.

10. Claims 3-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,640,408 to Jani et al. (hereinafter "Jani") in view of U.S. Patent No. 6,351,477 to Du (hereinafter "Du").

Claim 3 requires each diode array include five high-power diode bars. Du teaches exactly five high-power diode bars (figure 20). At the time of the invention, it would have been obvious to one having ordinary skill in the art to utilize the five laser diode configuration of Du in the system of Jani. The motivation for doing so would have been to uniformly pump the entire surface area of the laser rod.

Claim 4 requires the plurality of high-power diode bars have a spacing of about 12.5 mm in the diode array. It is well known in the art that one should space the diode arrays appropriately in order to optimize pumping uniformity and efficiency. Therefore, at the time of the invention, it would have been obvious to one having ordinary skill in the art to take the system of Jani and state a diode bar spacing of about 12.5 mm. The motivation for doing so would have been to uniformly pump the laser rod in order to minimize hot spots and reduce thermal stress, non-uniform gain and other undesirable thermal optical effects.

Claim 5 requires the distance from each diode array to the center of the laser rod be about 25 mm. It is well known in the art that one should distance the diode array from the center of the laser rod at a specific desired position due to the weakening of

pump radiation over larger distances. Therefore, at the time of the invention, it would have been obvious to one having ordinary skill in the art to take the system of Jani and state a distance from the diode arrays to the center of the laser rod be about 25 mm. The motivation for doing so would have been to pump the laser rod with a specific pumping power.

Claim 6 requires that the five diode arrays be placed around the circumference of the laser rod with an angular separation of about 72 degrees. Du teaches such a configuration (figure 20). At the time of the invention, it would have been obvious to one having ordinary skill in the art to utilize the 72 degree separation laser diode configuration of Du in the system of Jani. The motivation for doing so would have been to uniformly pump the entire surface area of the laser rod.

11. Claims 3-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,978,407 to Chang et al. (hereinafter "Chang") in view of U.S. Patent No. 6,351,477 to Du (hereinafter "Du").

Claim 3 requires each diode array include five high-power diode bars. Du teaches exactly five high-power diode bars (figure 20). At the time of the invention, it would have been obvious to one having ordinary skill in the art to utilize the five laser diode configuration of Du in the system of Chang. The motivation for doing so would have been to uniformly pump the entire surface area of the laser rod.

Claim 4 requires the plurality of high-power diode bars have a spacing of about 12.5 mm in the diode array. It is well known in the art that one should space the diode

arrays appropriately in order to optimize pumping uniformity and efficiency. Therefore, at the time of the invention, it would have been obvious to one having ordinary skill in the art to take the system of Chang and state a diode bar spacing of about 12.5 mm. The motivation for doing so would have been to uniformly pump the laser rod in order to minimize hot spots and reduce thermal stress, non-uniform gain and other undesirable thermal optical effects.

Claim 5 requires the distance from each diode array to the center of the laser rod be about 25 mm. It is well known in the art that one should distance the diode array from the center of the laser rod at a specific desired position due to the weakening of pump radiation over larger distances. Therefore, at the time of the invention, it would have been obvious to one having ordinary skill in the art to take the system of Chang and state a distance from the diode arrays to the center of the laser rod be about 25 mm. The motivation for doing so would have been to pump the laser rod with a specific pumping power.

Claim 6 requires that the five diode arrays be placed around the circumference of the laser rod with an angular separation of about 72 degrees. Du teaches such a configuration (figure 20). At the time of the invention, it would have been obvious to one having ordinary skill in the art to utilize the 72 degree separation laser diode configuration of Du in the system of Chang. The motivation for doing so would have been to uniformly pump the entire surface area of the laser rod.

12. Claims 4, 5, 12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication No. 2002/0018288 to Rieger et al. (hereinafter "Rieger").

Claims 4 and 12 require the plurality of high-power diode bars have a spacing of about 12.5 mm in the diode array. It is well known in the art that one should space the diode arrays appropriately in order to optimize pumping uniformity and efficiency. Therefore, at the time of the invention, it would have been obvious to one having ordinary skill in the art to take the system of Rieger and state a diode bar spacing of about 12.5 mm. The motivation for doing so would have been to uniformly pump the laser rod in order to minimize hot spots and reduce thermal stress, non-uniform gain and other undesirable thermal optical effects, as is suggested by Rieger (paragraph 0128).

Claims 5 and 13 require the distance from each diode array to the center of the laser rod be about 25 mm. It is well known in the art that one should distance the diode array from the center of the laser rod at a specific desired position due to the weakening of pump radiation over larger distances. Therefore, at the time of the invention, it would have been obvious to one having ordinary skill in the art to take the system of Rieger and state a distance from the diode arrays to the center of the laser rod be about 25 mm. The motivation for doing so would have been to pump the laser rod with a specific pumping power, as is suggested by Rieger (paragraph 0128).

Citation of Pertinent References

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patent documents further show the state of the art with respect to solid-state laser systems:

a. U.S. Patent No. 6,567,453 to Yamamoto et al.

b. U.S. Patent Application Publication No. 2004/0028108 to Govorkov et al.

Communication Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leith A. Al-Nazer whose telephone number is 571-272-1938. The examiner can normally be reached on Monday-Friday, 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Don Wong can be reached on 571-272-1834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LA

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PRIMARY EXAMINER